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Item 5 (c) of the provisional agenda*

**Matters for consideration or action by the
Conference of the Parties: mercury waste,
in particular consideration of relevant
thresholds**

**Report on the outcome of the open-ended process on waste
thresholds called for under article 11**

Note by the secretariat

1. In decision MC-1/19, on mercury waste, the Conference of the Parties to the Minamata Convention on Mercury established an open-ended process on waste thresholds called for under article 11, and requested the secretariat to:

- (a) Circulate an open call to all parties, non-parties and other relevant stakeholders for the nomination of experts to participate in the process, including a request for a brief description of their relevant expertise;
- (b) Call for submissions by the experts related to the types of waste that fall within the categories specified in paragraph 2 of article 11;
- (c) Prepare an organized compilation of the information received;
- (d) Circulate the compilation to experts, with a request for input on prioritizing the types of waste that are most relevant to the establishment of waste thresholds, mindful of the objective of the Convention, including the basis for such prioritization;
- (e) Consolidate the input received from the experts, and provide the consolidation to the experts, with a request for the submission of possible approaches to establishing any needed thresholds for the waste prioritized above;
- (f) Report to the Conference of the Parties at its second meeting on the outcomes to date of the open-ended process.

2. The report on the outcome of the process, including a consolidation of the submissions from nominated experts, is set out in the annex to the present note.

3. Regarding the types of waste that fall within the categories specified in paragraph 2 of article 11, a draft table of examples of waste consisting of, containing, or contaminated with mercury or mercury compounds was developed (see annex to the present note). The draft table includes reference to issues to be discussed on the inclusion or description of certain types of waste.

* UNEP/MC/COP.2/1.

4. Regarding the prioritization of the types of waste that are most relevant to the establishment of waste thresholds, a consensus has emerged that waste contaminated with mercury was of a high priority. Differing views were expressed as to the priorities in terms of the other types of waste. Experts also noted that thresholds regarding overburden, waste rock and tailings from mining needed separate consideration, with differing views on the prioritization of that work.
5. Regarding the identification of possible approaches to establishing thresholds, experts identified three different approaches in describing the thresholds, namely, total concentration of mercury in the waste, measures of the release potential of mercury in the waste, and a qualitative determination (i.e., a listing approach). Different views were expressed on which approach should be taken.
6. Experts acknowledged the need for further discussion on the approaches to establishing thresholds, as well as further collection of information, including on the mercury content of waste, national regulations and guidelines, and methods for sampling and analysis. Experts suggested that face-to-face meetings or conference calls might be needed for further discussion.
7. Information submitted by the nominated experts that may contribute to the development of mercury waste thresholds is compiled in UNEP/MC/COP.1/INF/10.

Suggested action by the Conference of the Parties

8. The Conference of the Parties may wish to review the progress achieved during the open-ended process by considering the outcome of the process, set out in the annex to the present note, and decide on further action, taking into account the most effective modalities for determining relevant thresholds, including the further work needed to establish mercury waste thresholds, as identified by the experts and described in paragraphs 44 and 45 of the annex.

Annex

Consolidation of submissions from experts nominated to the open-ended process to initiate work on the relevant thresholds called for under article 11

A. Overview

1. The present report presents an organized compilation of submissions received from nominated experts on mercury waste thresholds. Comments were invited in three rounds as follows:

(a) In the first round, 12 experts commented on the types of waste that fall within the categories specified in paragraph 2 of article 11.

(b) In the second round, 20 experts commented on the prioritization of waste for the establishment of mercury waste thresholds.

(c) In the third round, 14 experts commented on possible approaches to establishing any needed thresholds for the waste prioritized as described in paragraph 1 (b) above.

2. A number of experts provided information that may contribute to the development of thresholds, such as existing national guidelines and data related to mercury content of waste. That information has been compiled in document UNEP/MC/COP.2/INF/10.

B. Types of mercury waste

1. Definition of mercury waste

3. Article 11 of the Minamata Convention on Mercury defines mercury wastes as substances or objects:

- (a) Consisting of mercury or mercury compounds;
- (b) Containing mercury or mercury compounds; or
- (c) Contaminated with mercury or mercury compounds.

4. A number of experts stressed the need for further clarification of these terms. One expert, referring to discussions in the intergovernmental negotiating committee, proposed the following definitions for further discussion:

(a) Consisting of mercury or mercury compounds: the significant compound of the waste is mercury or a mercury compound. ("significant" could be defined by a range of concentration, e.g., 0.1–100 per cent);

(b) Containing mercury or mercury compounds: mercury or mercury compounds were added intentionally to the original material which is a waste now;

(c) Contaminated with mercury or mercury compounds: mercury or mercury compounds were not added intentionally to the original material which is a waste now.

5. Another expert preferred to include some flexibility so that all mercury waste could be identified in a practical way, and without dedicating resources to assigning a waste that was clearly subject to paragraph 2 of article 11 to a particular category. According to this expert:

(a) Waste consisting of mercury or mercury compounds is regarded as relatively pure mercury, or technical grade commercial mercury chemicals, or otherwise high-mercury concentration wastes;

(b) Waste containing mercury or mercury compounds is generally considered to identify discarded or spent mercury-added devices or products;

(c) Waste contaminated with mercury or mercury compounds would be an "all other" category, and consist of most industrial waste and wastewater from processes that use mercury or mercury compounds in some way.

6. Yet another expert observed that examples of waste contaminated with mercury were needed for clarification purposes, requiring the development of an indicative, non-exhaustive list.

2. Examples of mercury waste

7. Paragraph 3 (a) of article 11 of the Minamata Convention requires parties to take appropriate measures so that mercury waste is managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. The technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds under the Basel Convention (UNEP/CHW.12/5/Add.8/Rev.1) cover the following categories of mercury waste:

A: Wastes consisting of mercury or mercury compounds (e.g., excess mercury from the decommissioning of chlor-alkali facilities, mercury recovered from wastes containing mercury or mercury compounds or wastes contaminated with mercury or mercury compounds or surplus stock of mercury or mercury compounds designated as waste);

B: Wastes containing mercury or mercury compounds;

B1: Wastes of mercury-added products¹ that easily release mercury into the environment, including when they are broken (e.g., mercury thermometers, fluorescent lamps);

B2: Wastes of mercury-added products other than those listed in B1 (e.g., batteries);

B3: Wastes containing mercury or mercury compounds that result from the treatment of mercury wastes listed as A, B1, B2 or C;

C: Wastes contaminated with mercury or mercury compounds (e.g., residues² generated from mining processes, industrial processes or waste treatment processes).

8. One expert noted that the category B3 in the previous paragraph was confusing since residuals from wastewater treatment or production process were categorized as C, and treatment residuals should be consistently categorized regardless of their sources. A number of other experts also raised questions on category B3.

9. The technical guidelines under the Basel Convention include a table listing examples of types of mercury waste, which has been used as a basis for the table below. The comments of experts on the types of waste have been incorporated into the table, with additional examples underlined. One expert observed that the table needed more discussion and refinement, although that work should be deferred until there was consensus on the broader questions raised by the threshold-setting exercise.

10. One expert proposed the inclusion of waste arising from waste management operations, such as mercury sulphides from the stabilization of waste, and mercury or slags from (pre-)treatment of waste contaminated with mercury, noting that different steps of waste treatment sometimes happened in different facilities. How those wastes should be listed may need further discussion.

11. One expert objected to categorizing mining waste as waste contaminated with mercury, since those were materials in which mercury was naturally occurring, and to construe those materials as "contaminated" was inaccurate. According to that expert, an accepted definition of "contamination" by the Society of Environmental Toxicology and Chemistry was a "condition in which substances are present where they would not normally be found or where they occur above natural background levels."

¹ "Mercury-added product" means a product or product component that contains mercury or a mercury compound that was intentionally added (see art. 2 (f) of the Minamata Convention).

² One expert commented that the word "residue" should be clarified.

List of types mercury waste

A: Wastes consisting of mercury or mercury compounds

Source	Examples of waste types	Remarks	Comments from experts
Primary (virgin) metal production			
<u>Gold amalgamation</u>	Mercury used for amalgamation, recovered mercury		One expert proposed the deletion of this entry from the list, since gold amalgamation was only practiced in ASGM, which was covered by article 7. A number of experts disagreed with the proposal, noting that waste from ASGM was not exempted from article 11.
Metal (copper, lead, zinc) extraction and initial processing	Calomel recovered from zinc, lead and copper smelting process		One expert commented that to the extent that calomel was being sold into commerce and therefore addressed by article 3, it should not be considered as mercury waste. Another expert disagreed, mentioning an example where calomel was shipped for landfill. One expert wondered where by-product mercury (e.g., from precipitation and distillation in the Merrill Crowe process) should be listed. It could probably be listed here.

Intentional use of mercury in industrial production

Chlor-alkali production with mercury technology	Waste electrodes, recovered mercury	- Mercury cell - Mercury recovery units (retort)	One expert proposed the deletion of "recovered mercury" from the examples, except for chlor-alkali, since the recovered mercury had an allowable use and was therefore a commodity, not a waste. A note may be added to recovered mercury that has allowable use under the Convention. It should be noted that mercury from the decommissioning of mercury is listed under secondary metal production - recovery of mercury.
Production of alcoholates (e.g., sodium or potassium methyllate or ethyllate), dithionite and ultrapure potassium hydroxide solution	Waste electrodes, recovered mercury	- Mercury cell - Mercury recovery units (retort)	
VCM production with mercuric chloride (HgCl ₂) catalyst	Waste catalyst, recovered mercury	Mercury catalyst process	Waste catalyst is also listed in category C. One expert commented that waste

Source	Examples of waste types	Remarks	Comments from experts
			catalyst from VCM production should be listed under category C and deleted from category A. According to that expert, VCM manufacturers did not recover mercury from catalyst but the recovery was done in a separate plant. It could therefore be mentioned under "secondary metal production – recovery of mercury".
	Acetaldehyde production with mercury sulphate (HgSO ₄) catalyst	Waste catalyst, <u>recovered mercury</u>	• Mercury catalyst process
	Polysulfone production using mercury-containing catalyst	Waste catalyst, <u>recovered mercury</u>	• <u>Mercury catalyst process</u>
	Other production of chemicals and pharmaceuticals with mercury compounds and/or catalysts	Waste catalyst, <u>recovered mercury</u>	• Mercury catalyst process
	Production of mercury-added products	<u>Unused raw material, recovered mercury</u>	
	Products and applications with intentional use of mercury		
	Laboratory chemicals and equipment	Stockpiles of laboratory chemicals	• Mercury • Mercury chloride, etc., • Mercury
	Mercury metal use in religious rituals and folklore medicine	<u>Excess mercury</u>	
	Lighthouse equipped with mercury bearings	<u>Mercury in the bearing to float and revolve a lens apparatus, including mercury stored for replenishment</u>	One expert questioned the relationship of this entry with the "light sources with mercury" listed under category B. It is understood that this is the use of mercury bearing, not a light source
	Secondary metal production		
	Recovery of mercury	<u>Recovered mercury</u>	• Includes recovery of mercury from mercury waste and contaminated soil • One expert questioned whether, for example, mercury recovered from decommissioning of chlor-alkali facilities should be listed here or as "intentional use of mercury in industrial production" • It should be noted that paragraph 5 (b) of article 3 stipulates that excess

Source	Examples of waste types	Remarks	Comments from experts
Small-scale jewellery processing (artisanal recovery of gold waste in or near craft shops)	Recovered mercury	Amalgamation	mercury from the decommissioning of chlor-alkali facilities should be disposed of using operations that do not lead to recovery, recycling, reclamation, direct re-use or alternative uses. "Recovery of gold from e-waste" was removed from the list, since it is not likely that waste consisting of mercury would arise from this process. This process is listed under category C.

B: Wastes containing mercury or mercury compounds

Source	Examples of waste types	Remarks	Comments from experts
Products and applications with intentional use of mercury			
Thermometers and other measuring devices with mercury	Used, obsolete or broken products	Mercury	
Electrical and electronic switches, contacts and relays with mercury			
Light sources with mercury			
Batteries containing mercury		- Vapour-phase mercury - Divalent mercury adsorbed on phosphor powder - Mercury, mercury oxide - Mercury compounds (mainly ethylmercury chloride) - Phenylmercuric acetate and similar mercury compounds	One expert proposed the deletion of paints until enough supporting evidence was obtained. Needs further discussion.
Biocides and pesticides	Stockpiles of obsolete pesticides.		
Paints	Stockpiles of obsolete paints		
Pharmaceuticals for human and veterinary uses	Stockpiles of obsolete pharmaceuticals	- Thimerosal - Mercuric chloride - Phenylmercuric nitrate - Phenylmercuric acetate	

Source	Examples of waste types	Remarks	Comments from experts
Cosmetics and related products	Stockpiles of cosmetics and related products	- Mercury iodide - Ammoniated mercury, etc.,	
Dental amalgam fillings	Stockpiles of dental amalgam, removed fillings, capsules, equipment	Alloys of mercury, silver, copper and tin	
Manometers and gauges	Used, obsolete or broken products	Mercury	
Laboratory chemicals and equipment	Stockpiles of laboratory chemicals and equipment	- Mercury - Mercury chloride, etc.,	
Polyurethane elastomers	Polyurethane products		One expert questioned whether this should be listed under category B. Used or end-of-life polyurethane product is listed under C. Further discussion may be needed.
Miscellaneous product uses, mercury metal uses and other sources	Stockpiles	- Infra-red detection semiconductors with mercury - Ammunition and detonators - Bougie and Cantor tubes - Educational uses, etc.,	

C: Wastes contaminated with mercury or mercury compounds

Source	Examples of waste types	Remarks	Comments from experts
Extraction and use of fuels/energy sources			
Other coal combustion	Flue gas cleaning residues (fly ash, particulate matter, wastewater, gypsum, sludge, etc.), bottom ash	Accumulation in bottom ashes and flue gas cleaning residues.	In relation to wastewater mentioned here and elsewhere, one expert noted that discussion was needed on the types of wastewater addressed under article 12, while releases to water were addressed under article 9.
Coke production	Sludge generated at separator tanks and sedimentary sand tanks, mercury absorbers		One expert strongly recommended the deletion of "extraction and use of fuels/energy sources" since the concentration was usually very low (lower than 1mg/kg or even 0.1mg/kg for coal fly ash, bottom ash, gypsum, etc.), noting that it would be better not to cover every source from the outset.
Extraction, refining and use of mineral oil	Oil refining catalyst		Another expert opposed the deletion on the grounds that there was a significant
Extraction, refining and use of natural gas			
Extraction and use of other fossil fuels			
Biomass fired power and heat generation			

Source	Examples of waste types	Remarks
Primary (virgin) metal production		
Primary extraction and processing of mercury	Tailings, extraction process residues, flue gas cleaning residues, wastewater treatment residues, debris	Pyrometallurgy of mercury ore
Gold amalgamation	Tailings, extraction process residues, flue gas cleaning residues, wastewater treatment residues, debris	- Thermal treatment of gold - Industrial processing
Metal (aluminium, copper, gold, lead, manganese, zinc, primary ferrous metal, other non-ferrous metals) extraction and initial processing	Tailings, extraction process residues, flue gas cleaning residues, wastewater treatment residues, debris	- Industrial processing - Thermal treatment of ore - Amalgamation

concentration of mercury in fuels other than coal

A report referred to in an expert's comment also highlighted waste rock, river sediments, among others.

"Sponge gold/gold production from ASGM sources" is listed as "products and applications with intentional use of mercury" in the Basel technical guidelines

One expert commented that gold amalgamation was practised only in ASGM, where flue gas cleaning and wastewater treatment were unlikely. Another expert pointed out that gold amalgamation was practiced in "fire gilding" or gold plating in certain countries. Another expert proposed the deletion of gold amalgamation because it was covered by article 7 of the Convention

One expert requested clarification as to the relationship between this list and the provisions of paragraph 2 of article 11 on overburden, waste rock and tailings from mining

One expert proposed the deletion of aluminium, manganese, primary ferrous metal, other non-ferrous metal from the first column. The deletion of tailings and debris was also proposed. These were included in the original table in the Basel technical guidelines (except for debris). Needs further discussion

Source	Examples of waste types	Remarks
Production processes with mercury impurities		
Cement production	Process residues, flue gas cleaning residues, sludge	Pyroprocessing of raw materials and fuels with naturally occurring mercury impurities
Pulp and paper production		Combustion of raw materials with naturally occurring mercury impurities
Lime production and lightweight aggregate kilns		Calcination of raw materials and fuels with naturally occurring mercury impurities
Intentional use of mercury in industrial production		
Chlor-alkali production with mercury technology	Solid waste contaminated with mercury, waste electrodes, process residues, soil, wastewater treatment residues, waste activated carbon	- Mercury cell - Mercury recovery units (retort)
Production of alcoholates (e.g., sodium or potassium methylate or ethylate), dithionite and ultrapure potassium hydroxide solution	Solid waste contaminated with mercury, waste electrodes, process residues, soil	- Mercury cell - Mercury recovery units (retort)
VCM production with mercuric chloride (HgCl ₂) catalyst	Process residues, waste catalyst, wastewater treatment residues, waste activated carbon	Mercury catalyst process
Acetaldehyde production with mercury sulphate (HgSO ₄) catalyst	Wastewater, waste catalysts	Mercury catalyst process
Polyurethane production using mercury-containing catalyst	Process residues, wastewater, waste catalysts	Mercury catalyst process
Gilding	Gilding residues	
Other production of chemicals and pharmaceuticals with mercury compounds and/or catalysts	Process residues, wastewater, waste catalysts	Mercury catalyst process
Production of products referred to in the next section of this table	Process residues, wastewater	
Products and applications with intentional use of mercury		
Use of mercury-added products	Wastewater treatment residues, solid wastes, contaminated soil	- Mercury; - Mercury chloride, etc.,
		Includes waste from laboratories, dental clinics, etc.

Source	Examples of waste types	Remarks
Polyurethane elastomers	Used or end-of-life products	Includes decommissioned mercury-catalysed polyurethane flooring One expert mentioned Polyisocyanide (Tartan, athletic ground flooring).
Mercury metal use in religious rituals and folklore medicine	Solid waste, wastewater treatment residues	• Mercury
Objects treated with biocides, pesticides or paints containing mercury	Treated wood, vessels, paint flakes, contaminated soil, etc.	
Miscellaneous product uses, mercury metal uses and other sources	Wastewater treatment residues, solid wastes	• Infrared detection semiconductors with mercury • Bougie and Cantor tubes • Educational uses, etc
Secondary metal production		
Recovery of mercury	Materials contaminated by spillage during recycling processes, extraction process residues, flue gas cleaning residues, wastewater treatment residues	One expert noted that "spillage" itself should be waste consisting of mercury if properly collected. Another expert noted that spillage on to wooden pallets, timber flooring, soil and carpet was not uncommon so the definition should not be limited to "consisting of". One expert proposed the deletion of this entry and the entry on the recovery of other metals, such as copper and aluminium. These were included in the original table in the Basel technical guidelines (except for debris). Further information would be needed to discuss whether these should be included
Recovery of ferrous metals		• Shredding • Smelting of materials containing mercury
Recovery of other metals, such as copper and aluminium		• Other mercury-added materials or products/components • Mercury • Thermal process
Recovery of gold from e-waste (printed circuit boards)		One expert proposed limiting this entry to "Recovery of gold from e-waste (printed circuit boards using mercury amalgamation)" or other specific process generating mercury wastes, and the deletion of the thermal process.

Source	Examples of waste types	Remarks
Small-scale jewellery processing (artisanal recovery of gold waste in or near craft shops)	Wastewater, extraction process residues, solid waste (including dust and ash)	since there were only trace amounts of mercury in printed circuit boards. This was included in the original table in the Basel technical guidelines (except for debris). Further information would be needed to discuss how this should be described.
Waste incineration		
Incineration of municipal solid waste	Flue gas cleaning residues, wastewater treatment residues, incineration residues	One expert proposed the deletion of this entry and the entry on the recovery of other metals, such as copper and aluminium. These were included in the original table in the Basel technical guidelines (except for debris). Further information would be needed to discuss whether these should be included.
Incineration of hazardous waste	Unsorted mercury-added products and process waste	One expert proposed the deletion of these entries, since mercury was not a main pollutant in waste incineration, and fly ash, etc., was already managed as hazardous waste in many countries. Another expert pointed out that in some countries it was not properly managed. Needs further discussion.
Incineration of medical waste	Natural mercury impurities in high volume materials (e.g., plastics, paper) and minerals	One expert proposed the deletion of "natural mercury impurities" while supporting including that phrase for the "incineration of hazardous waste". The rationale was that mercury might be emitted in the incineration process, whereas mercury was not condensed in landfilling.
Sewage sludge incineration		
Waste deposition/landfilling and wastewater treatment		
Controlled landfills/deposits	Mercury-added products and process waste Wastewater, wastewater treatment residues, solid waste contaminated with mercury	

Source	Examples of waste types	Remarks
Diffuse deposition under some control		
Uncontrolled local disposal of industrial production waste		
Uncontrolled dumping of general waste		
Wastewater system/treatment	Wastewater treatment residues, slurries	- Intentionally used mercury in spent products and process waste - Mercury as an anthropogenic trace pollutant in bulk materials One expert noted the contribution of dental amalgam in human waste, which was treated in municipal wastewater plants. The same expert also highlighted mercury contained in sludges used as fertilizers.
Construction/demolition waste	Mercury-contaminated rubbles, debris and soil	Building materials contaminated with mercury or mercury compounds
Land remediation activities	Mercury-contaminated soil	Land contaminated with mercury from production or process facilities One expert noted that there was a possibility of establishing thresholds for contaminated soil in the guidance under article 12 of the Convention. One expert noted that it might be necessary to distinguish between on-site and off-site remediation.
Dredging	Sediment and slurries contaminated with mercury	
Crematoria and cemeteries		
Crematoria	Flue gas cleaning residues, wastewater treatment residues, residual bone ash	Dental amalgam fillings
Cemeteries	Soil contaminated with mercury	

Note: Examples were taken from Basel Convention technical guidelines. Additional examples and comments received from experts are underlined.

Abbreviations: ASGM – artisanal and small-scale gold mining, VCM – vinyl chloride monomer.

C. Priorities in establishing mercury waste thresholds

1. Role of mercury waste thresholds

12. One expert summarized the functions of the mercury waste thresholds under the Convention as follows:

(a) To exclude from the scope of article 11 certain wastes, which in the absence of thresholds would be covered by the provisions of the Convention;

(b) To include in the scope of article 11 certain mercury wastes from mining, other than primary mercury mining, which in the absence of thresholds would not be covered by the provisions of the Convention.

13. A number of experts discussed the need for thresholds to classify waste leading to specific environmentally sound management. For example, the Basel Convention technical guidelines provided specific guidance on the management of waste consisting of, containing and contaminated with mercury. Other experts cautioned that, as the exercise pertained to the establishment of thresholds to determine whether certain wastes fell under the provisions of article 11 of the Convention, the development of thresholds to categorize mercury waste should be subject to a possible subsequent decision of the Conference of the Parties.

2. General priority

14. Some experts were of the view that priority should be given to types of waste that had greater potential for emission or release to the environment, and adverse effects on human health and the environment. Some experts also placed high priority on types of waste for which there existed cost-effective measures to control environmental releases of mercury. Another expert ranked the source categories of mercury waste in terms of the presence of mercury and its potential effects on human health and the environment, according to the following three categories: production of primary metals (virgin), intentional use of mercury in industrial production, and products and applications with intentional use of mercury.

15. The majority of the experts provided comments explicitly mentioning the three categories of mercury waste as described in paragraph 2 of article 11. There was an emerging consensus that waste contaminated with mercury and mercury compounds was of high priority.

16. A number of experts identified waste contaminated with mercury and mercury compounds as the only category for which thresholds were needed. However, as described below, some experts gave high priority to other categories, with one observing that waste contaminated with mercury was the most difficult category and that work should begin with other easier categories. Further discussion is needed on these priorities.

17. A number of experts pointed out that mining waste needed to be addressed as a separate category.

3. Waste consisting of mercury or mercury compounds

18. A number of experts said that waste consisting of mercury was so obviously highly toxic that there was no need for thresholds for that category. Any mismanagement of such waste could seriously threaten human health and the environment and, for these experts, therefore, no thresholds were needed for that category and all such waste should continue to be covered by article 11.

19. One expert strongly disagreed with that view, stating that the Convention explicitly called for the development of thresholds. Presumably, all wastes in that category would easily exceed a threshold and be subject to article 11. However, clearly identifying them as subject to the threshold would make that point unambiguous in the event that a waste was, for some party, not self-evidently subject to article 11. Two other experts also assigned relatively high priority to that category of mercury waste, since it was the type of mercury waste that required the most stringent control and might therefore need to be distinguished from waste contaminated with mercury or mercury compounds. A number of experts pointed out that waste consisting of mercury and mercury compounds could be discharged in the form of mixture with other chemical substances.

20. Early in the commenting round, a 95 per cent threshold was suggested for elemental mercury. A number of experts commented on the 95 per cent limit mentioned in the earlier compilation document. Although two comments supported the use of a 95 per cent threshold, a number of experts pointed out that that was only a threshold to control the supply and trade of mercury (article 3). One expert strongly objected to using that value, since waste consisting of 85 per cent mercury would need the same level of control as pure mercury. One expert observed, however, that in the new situation

where mercury was internationally regulated, commodity mercury might become waste and it was only possible to define waste consisting of mercury by means of the widely used 95 per cent standard.

21. Regarding mercury compounds, article 2 of the Convention provides that "mercury compound" means any substance consisting of atoms of mercury and one or more of other atoms of other chemical elements that can be separated into different components only by chemical reactions. One expert noted that if the category was defined based on total mercury, it would be necessary to account for the fact that compounds would have lower percentages of mercury. For example, a waste consisting of 100 per cent calomel contained 85 per cent mercury.

4. Waste containing mercury or mercury compounds

22. A number of experts saw no need for developing thresholds for waste containing mercury or mercury compound. The waste that fell under this category was discarded or used products and applications in which mercury was used intentionally. If inappropriately managed, such waste would lead to emissions and releases of mercury and mercury compounds that would potentially threaten human health and the environment. Hence, for these experts, no thresholds were needed for category B wastes as they were of the view that such wastes should all continue to be covered by article 11.

23. One expert noted, however, that identifying mercury-containing products might not always be easy. By listing them as wastes that exceeded the threshold, based on knowledge of their mercury content, they could be clearly identified. A number of experts noted that annex A of the Minamata Convention only listed products for mercury phase-out (or phase-down) based on the current and future availability of alternative products, and therefore the waste management of mercury-added products should not be limited to annex A, although that list might represent a starting point.

24. One expert observed that, while many waste mercury-added products (e.g., thermometers, switches, fluorescent lamps) were easy to identify, there were categories that might sometimes, but not always, contain mercury and that were not readily distinguishable from their non-mercury alternatives. The latter categories could include button-cell batteries, paints, pigments, fireworks, mirrors and polyurethane flooring. The same expert assigned the highest priority to products identified in part I of annex A of the Convention and other end-of-life products that could readily be identified as containing mercury or mercury compound, and second highest priority to end-of-life products that might contain mercury or mercury compounds but which were difficult to identify or distinguish from their non-mercury alternatives, since threshold development would probably require more time and work.

25. Another expert assigned medium priority to establishing thresholds based on the types of products, since the amount of mercury typically added to the products should be known.

5. Waste contaminated with mercury or mercury compounds

26. The majority of experts assigned high priority to waste contaminated with mercury. A number of experts viewed this as a "catch-all" category (excluding mining wastes), which relied more on mercury content than listing.

27. One expert observed that this was the only category that needed a threshold that would exclude certain waste from the requirements of article 11, since the potential of the management of such wastes to cause emissions and releases threatening human health and the environment could vary depending on the type of waste and the content of mercury and mercury compounds therein.

28. Two experts suggested priorities for different types of waste listed in the table, but one expert commented that the basis for such prioritization was unclear. Another expert observed that the category was very broad, ranging, for example, from contaminated construction materials to residues of industrial processes, and a list of such wastes would assist parties to focus waste management efforts on the appropriate wastes. The table provides useful information that could be used to establish such a list.

29. Another expert prioritized waste in this category which included contaminated soil, industrial solid waste, sludges, filter cake, mine tailings. It might also include articles or materials that had become contaminated with mercury as a result of spills, such as on textiles, carpets and timber.

6. Overburden, waste rock and tailings from mining

30. Differing views were expressed with regard to the prioritization of mining waste. One expert included this waste as a highest priority task, expressing particular concern about tailings from gold, lead, zinc, copper and silver mining. Another expert commented that thresholds should be determined for mine tailings given that emissions and releases of mercury and mercury compounds from mine tailings could seriously threaten human health and the environment, whereas thresholds might not be

needed for overburden and waste rocks. Yet another expert observed that this was a complex issue requiring further discussion, and that it should be considered as a second priority.

31. Two other experts noted that overburden, waste rock and tailings from non-primary mercury mining generally contained mercury in the highly insoluble forms that were present in the original earthen materials, were already regulated nationally, and were managed on-site in specifically designed facilities where there was no exposure to the public, and therefore mining waste that was not from primary mercury mining was of a very low priority. One expert commented that this was not only an issue of human exposure and tailings being "far away", but that it was necessary to consider volatilization and releases to water bodies.

D. Possible approaches to establishing threshold

1. Three approaches – total mercury content, release potential and listing approach

32. Three approaches to establishing thresholds have been identified, namely, total concentration of mercury in a waste, measures of the release potential of mercury in a waste, and a qualitative determination (i.e., a listing approach).

33. Total mercury content of a waste represents the most straightforward type of threshold. It identifies the presence of mercury in the waste, and assumes that the more mercury present, the higher its potential to pose an actual hazard. It does not attempt to identify the risk that may be posed by the waste (i.e., the likelihood of exposure with resulting adverse health effects). Any total concentration threshold measure will always, therefore, be somewhat arbitrary, although it may be possible to achieve consensus on particular values for different wastes being considered.

34. Measures of release potential could be based on the form of mercury in the waste, or aspects of the waste matrix that facilitate or retard release to the environment, and may be an appropriate basis for thresholds for some wastes. Measures of release potential are, however, often linked to particular management conditions (e.g., leach testing to assess groundwater contamination potential of wastes managed on land), and any single test may not address all release pathways.

35. Differing views were expressed as to the use of the leaching test. Some experts recommended that approach, especially for waste contaminated with mercury and mercury compounds, noting that such thresholds were used in some jurisdictions for regulating the management of mercury waste. Other experts viewed that approach as inadequate for establishing mercury waste thresholds under the Convention. The leaching procedure is typically a measure of risk that landfilled mercury waste poses to nearby drinking water wells. Accordingly, this exposure pathway fails to take into account the principal mercury exposure pathways of concern, such as inhalation, dermal exposure and the atmospheric emissions which contribute to the global pollution pool, eventually resulting in contaminated aquatic food sources. Basing the threshold on a leaching standard presumes the waste will be landfilled, since the procedure has no relevance to waste undergoing incineration or open burning. For all those reasons, these experts stated that where a threshold was needed for jurisdictional purposes, it should be based upon total concentrations, not leaching levels, although there may ultimately be a role for leaching standards in the waste management requirements, particularly for wastes destined to be landfilled. Further discussion is needed on this approach.

36. A qualitative (or listing) approach would recognize that most waste or end-of-life mercury-containing devices (i.e., devices with mercury added intentionally for a functional purpose) are identifiable as such, and therefore knowledge of these wastes could be a reliable basis for concluding that they "exceed a threshold". Similarly, waste consisting of mercury or mercury compounds could also be included based on the knowledge that most of the waste is elemental mercury or a mercury compound, without the need for testing.

37. One expert, discussing the validity and practicality of these approaches, suggested the following approaches for establishing thresholds:

(a) Waste consisting of mercury or mercury compounds: mercury concentration by weight or list of waste. It appears reasonable to specify mercury concentration above which stabilization or solidification is required. However, if it is difficult to agree on specific values, listing may be an alternative approach;

(b) Waste containing mercury or mercury compounds: list of waste or mercury concentration by weight. Mercury-containing products are relatively easy to identify and it would be too much of a burden to request the analysis of mercury content. However, since there are product categories where it is not easy to determine whether they contain mercury, mercury concentration may be an option;

(c) Waste contaminated with mercury or mercury compounds: mercury concentration by weight, together with acceptance criteria for disposal facilities. Total mercury content will be appropriate for determining whether mercury recovery is required. For final disposal, countries may have their own acceptance criteria for final disposal.

38. The views expressed by other experts on the first two categories appear to be consistent with that suggestion. For waste consisting of mercury, one expert proposed a 95 per cent threshold for mercury, but other experts observed that further discussion was required on the specific value. Some of the experts who did not see the need for thresholds for these types of waste viewed the listing of wastes as helpful.

39. With regard to waste contaminated with mercury, divergent views were expressed. Some experts proposed the use of total mercury concentration, since the threshold should be based on the intrinsic property of the waste irrespective of the waste management technology. Other experts proposed the use of the leaching test, expressing the view that it better reflected the risk to human health and the environment of mercury released to the environment. Yet other experts suggested that further work was needed to assess the applicability of the three approaches to specific waste types.

2. Mining waste

40. One expert, while questioning the need for establishing thresholds for this type of waste, observed that if any specific thresholds were considered, the natural background levels of mercury at the mine site and the risk of mercury exposure to humans and the environment from these materials needed to be taken into account.

41. One expert suggested the use of the leaching test and other measures of releases, noting that mining wastes would never be incinerated. Another expert proposed setting a threshold based on leachability as the first tier in determining if overburden, waste rock and tailings might be considered a "mercury waste" under the Convention, and said that if, and only if, the leachability threshold was exceeded, a second tier should come into play, which would be a site-specific threshold based on local precipitation/infiltration, specific chemistry, and risk of exposing downgradient human populations or biota. Still another expert suggested listing the types of ore tailings subject to the Convention coverage, regardless of concentration.

3. Issues to be considered in establishing thresholds

42. Experts were invited to present their views on issues to be considered in establishing thresholds. The comments received include the following.

(a) The waste categorization developed for the Convention must be easy to understand and apply in the field, including by developing countries. Accordingly, categorizations requiring testing in the field by customs or other government officials for purity or other chemical characteristics, or requiring the identification of the source of the waste, may be unworkable at present. Similarly, categorizations that were difficult to explain or required an extensive technical background may also be unworkable;

(b) In developing thresholds, national regulations and technical guidelines, as well as the requirements of the technical guidelines under the Basel Convention, should be taken into account;

(c) One expert observed that the release potential of mercury and its risk should be assessed. Another expert observed, however, that if mercury wastes were required to be managed according to the toxicity of each compound in the wastes, the analysis of each mercury compound for one type of mercury waste became a prerequisite. Owing to the high costs of analysis, it did not seem practically possible in the view of this expert that such management be introduced in each party;

(d) Since each country has different types of landfill (those for hazardous wastes or for non-hazardous wastes) as well as construction/operation standards and acceptance criteria for each type of landfill, it might be preferable to adopt their acceptance criteria as the thresholds. If there are countries that have not established such criteria, parties need to indicate the basic acceptance criteria as a reference for these countries;

(e) The availability of analytical methods will influence the decision about how to apply any threshold concentration to mercury compounds. All the basic analytical determinative methods for testing mercury wastes produce total mercury concentration as their result. Sampling and pre-treatment methods are also important;

(f) If all mercury-added product categories are to be included in the list, the list will become too long, which makes it difficult to judge whether or not a waste in question is a target waste. It is necessary, therefore, to establish a policy for the development of a list, for example firstly listing

product categories that may have an adverse impact on human health and the environment if they are not managed in an environmentally sound manner, and then expanding the list based on the progress of relevant measures taken by parties. It is also necessary to discuss how to keep the list updated.

43. One expert sought clarification as to whether the thresholds for the Minamata Convention need to be linked to the provisions of the Basel Convention on hazardous waste. According to that expert, if the thresholds needed to be aligned with the definition of hazardous waste under the Basel Convention, the thresholds might be too high to assure the sound management of mercury waste.

4. Work needed to establish thresholds

44. Issues that need further discussion identified in the previous paragraphs include the following:

- (a) Description of certain types of waste, such as residues from waste treatment;
- (b) Priorities for waste other than waste contaminated with mercury or mercury compounds;
- (c) Which approach (total mercury content, release potential and listing approach) should be applied for specific types of waste.

45. In addition, experts suggested some specific tasks including the following:

- (a) Survey of national information to be conducted, including the threshold for requiring the recovery of mercury, and acceptance criteria for waste disposal facilities;
- (b) Information on mercury concentration in waste to be collected;
- (c) Parties to be requested to provide types of waste not covered in the table, including the list of mercury-added products;
- (d) Information on available methods for sampling, pre-treatment and analysis of mercury waste to be analysed, including their cost.

46. A number of experts observed that face-to-face meetings or conference calls would be needed for further work.